Accuracy Assessment of the National Land Cover Database 2001 Imperviousness Data

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Landscape conditions of watersheds strongly influence the sustainability of aquatic resources valued by society including quality of drinking water, diversity of stream life, and resilience to catastrophic flooding. The amount of impervious surface area in a watershed is a key indicator of landscape change. As a single variable, it serves to integrate a number of concurrent interactions that directly influence a watershed's hydrology, stream chemical quality, in-stream habitat, and thus the ecological health of the stream. The National Land Cover Database 2001 (NLCD 2001) is being compiled across all 50 states and Puerto Rico. In addition to land cover data, the NLCD 2001 includes an independent per-pixel estimate of imperviousness derived from imagery and ancillary data using a regression tree analysis.

Our evaluation of the NLCD 2001 imperviousness data uses an accuracy assessment (AA) protocol established per Jarnagin et al. (2004). The AA protocol employs high-resolution, mapped vector truth impervious surfaces overlaid on the per-pixel impervious data in a geographic information system (GIS) environment and provides a means to assess the accuracy at multiple spatial scales. This AA effort is part of a US Geological Survey (USGS) internal prospectus on which EPA and USGS are collaborators (Jones et al., 2003). We used a stratified random sampling of areas selected across a gradient of urban development as defined by the NLCD 2001 in the Mid-Atlantic Piedmont and Coastal Plain ecoregions in the Chesapeake Bay Watershed. Here we report the results of our study. Examples of where the NLCD imperviousness estimator appears to be highly accurate are provided, along with examples of areas where the estimate is not as accurate. We also present our results for per-pixel and per-area accuracies across the sampling region.

This research is one of the results of an ongoing partnership between the EPA and USGS. The results of our research are being provided to the Chesapeake Bay Program (CBP) as a part of our effort to evaluate the accuracy and applicability of satellite-based estimates of impervious surface area. The CBP and other regional to local stakeholders who rely on these estimates of imperviousness will benefit from increased knowledge about when, where, at what spatial and temporal scale, and with how much confidence to use these products in their modeling and analysis efforts.

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